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Export led growth, pro poor or not?

Evidence from Madagascar's textile and apparel industry*

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Abstract

Madagascar's textile and apparel industry has been among the fastest growing in Sub-Saharan Africa. Fueled by low labor costs, a relatively productive labor force, and preferential access to industrial countries, Madagascar's exports of textile and apparel products grew from about 45 million USD in 1990 to almost half a billion USD in 2001. The impact of this export surge has been very large in terms of employment and wages; albeit less so in terms of poverty reduction. To address the concern of whether the poor benefit and to what extent, this paper follows a new approach suited to identify the beneficiaries of globalization and to quantify the benefits at the household level, so as to understand which segments of the population benefit most and which, if any, are marginalized. The analysis focuses on the labor market channel which has been recognized as the main transmission between economic growth and poverty. The methodology uses household level data and combines the wage premium literature with matching methods. The results point to a strong variation in the distribution of the benefits from export growth with skilled workers and urban areas benefiting most. From a poverty perspective, export led growth in the textile and apparel sector has only a small effect on overall poverty. This study points to two reasons for this. First, a large majority of the poor are unable to enjoy the new employment opportunities given their lack of skills sought by the expanding textile and apparel export industry. Second, most of the poor reside in rural areas, where the employment effect is very small. The results indicate that the effects of an increase in exports of textiles for poverty reduction are felt only in urban areas, mostly through creation of employment (rather than increases in wages). Indeed, some of the urban poor are good candidates for finding employment in the expanding sector. However, the urban poor are likely to find employment only in unskilled jobs. Given that unskilled wages are kept low by a large reserve labor sector, the gains are limited, and the overall impact on poverty is small. More generally, the results of this study suggest that two factors are required if export-led economic growth is to significantly reduce poverty. First, growth and job creation must not be restricted to a few geographic areas but need to reach areas where the majority of the poor live. Second, poor people must be assisted in obtaining the skills sought by expanding industries.

Keywords: Africa, Madagascar, Poverty, Trade, Employment.

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1. Introduction

Integration into the world economy has often been linked to rapid economic growth and development. However, one of the arguments in the globalization debate is that trade between developing and developed countries has done little to reduce poverty in developing countries, while resulting in the exploitation of labor and increased inequality.

So far, studies of the impact on poverty from comparative advantage based growth have mostly used models relying on few representative households, as in the CGE models.[1] These types of studies rely on a macroeconomic framework and rarely analyze the extent to which the benefits, or the costs, are distributed across different population groups.[2] However, welfare effects of economic growth averaged by country, or by broad household groups, although informative, are clearly insufficient in the analysis of a microeconomic phenomenon such as poverty.

Abstracting from macroeconomic models, a few studies have investigated the effects of globalization on welfare at a more detailed level. The results from those studies have found compelling evidence that integration into world markets, although beneficial for the poor, results in an unequal distribution of the benefits, with the poor gaining less than the non poor[3] (Bruno et al. 1996, Hanson 1997, Lundberg and Squire 2003, and Nicita 2004). From a policy standpoint, the issue of how the benefits of globalization are distributed is important because an increasing number of preferential treatments are expected to help the poorest countries to grow out of poverty.[4] In this regard, if the poor in developing countries fail to reap any benefit from the increase in trade flows, then the reliability of those preferential treatments aimed to curb poverty would be diminished.

[1] See Hertel and Reimer (2004) for a survey.
[2] The notable exception being Harrison et al.(2003). However, a fundamental problem is that microeconomic data needs to be combined (and reconciled) with macroeconomic data, a process which involves a degree of arbitrariness and assumptions and which increases with the number of representative households in the model.
[3] Also, a typical outcome is the increase in inequality between urban and rural areas and between skilled and unskilled workers.
[4] AGOA and EBA are the two major examples.

To address the concern of whether poor benefit and to what extent, this paper follows a new approach suited to identify the beneficiaries of globalization and to quantify the benefits at the household level, so as to understand which segments of the population benefit most and which, if any, are marginalized. The analysis focuses on the labor market channel which has been recognized as the main transmission between economic growth and poverty (McCulloch et al. 2001).

Economic growth works through the labor market to reduce poverty by creating employment, raising real wages, and increasing participation rates. However, employment growth per se is not sufficient to guarantee poverty reduction. For example, if employment growth is limited to low paying sectors, or if the poor do not possess the skills sought by the expanding sectors, economic growth will likely do little to reduce overall poverty. The extent to which growth is limited to low paid sectors and the extent to which the poor possess the skills sought by expanding industries are the issues examined in this paper.

To examine the effects of growth on individual welfare this paper develops a simple partial equilibrium model that draws on the information available from household surveys and provides a quantification of the effects of economic growth on the households. The methodology developed in this paper can be also used as the "second step" in studies that combine general equilibrium models with post simulation analysis of household impacts.[5] The purpose of the "second step" would be to translate the growth rates (forecasted within economy wide models in the "first step") into more precise welfare and poverty indicators.

As detailed below, the estimation methodology combines the matching methodology literature (to identify the individuals most likely to move into the expanding sector) with the industry wage premium literature (to quantify the gains of the individuals that move into the expanding sector). This methodology has parsimonious data requirements (a

household survey that identifies individuals and their sectors of employment) and is well suited to analyze the consequences of the integration of least developed countries into the world economy.

The methodology is applied to analyze the impact on social welfare resulting from export led growth in the textile industry in Madagascar. Arguably, Madagascar is an excellent example of how sectoral growth can affect poverty because of the rapid export growth in its textile and apparel industry and the country's widespread poverty. Moreover, because Madagascar shares many of the characteristics of least developed countries (high rates of poverty, low wages, and a large pool of 'reserve labor'), results from this case study might apply to other low income countries.

The results of the analysis suggest that the expansion of the textile industry in Madagascar produces a substantial increase in social welfare. However, while the poor receive a reasonable share of the increase in welfare, non poor households gain more both in percentage and absolute terms. With respect to poverty, in a five year scenario under a plausible employment growth of 20% per year in the textile and apparel industry[6], about 120,000 individuals are lifted out of poverty, decreasing national poverty by about 0.7 percentage point.

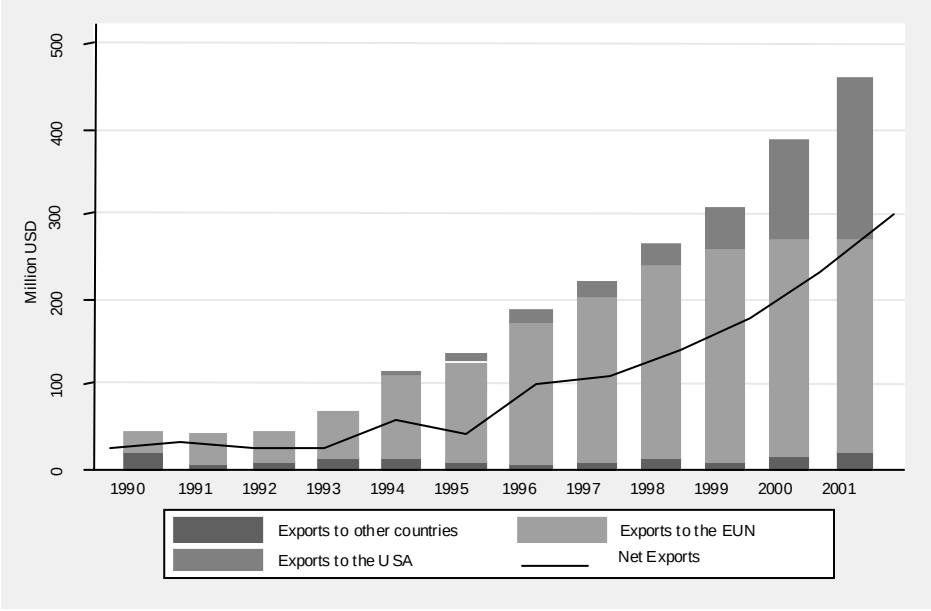
The remainder of this paper is structured as follows: section 2 describes the characteristics of the Malagasy textile sector; section 3 describes the methodology; section 4 discusses the econometric results; section 5 presents and discusses the results from a micro simulation exercise; and finally, section 6 summarizes the main conclusions.

2. The Textile and Apparel Sector in Madagascar

[5] Studies using a two-step approach are becoming more common in the trade and poverty literature because they dispel part of the burden of including all the households in the CGE model, while still producing detailed distributional results, as in Bourguignon et al. (2003).

Madagascar's textile industry is one of the fastest growing in Sub-Saharan Africa. Given Madagascar's low labor costs and a fairly productive labor force, the industry attracts investors from Mauritius, Hong Kong, Malaysia, Singapore and China as well as from Middle Eastern countries. Moreover, Madagascar enjoys a number of policy induced comparative advantages. In particular, Madagascar has quota and duty free access to EU and US markets as a consequence of EBA, Cotonou and AGOA agreements. As an additional advantage, Madagascar's textile and apparel industry is exempted from the rules of origin embedded in the AGOA agreements.[7] Because of all these issues, export of textile products has been soaring in Madagascar since the late 1990s. Figure 1 shows export growth in Madagascar's textile and apparel between 1990 and 2001.

Figure 1 – Madagascar exports of textiles and apparel products, 1990 – 2001.



Between 1990 and 2001 exports jumped from less than 50 million USD to more than 450 million USD. The growth in exports was driven first by a surge in exports to the

[6] This reflects the historical growth rate of the textile and apparel industry in Madagascar between 1999 and 2001. During this period employment has increased from about 136,000 to 190,000 individuals.

European markets in the mid 1990s, and thereafter from a surge in exports to the US markets driven by the advantages provided by the AGOA agreement.

The growth of the textile and apparel industry revealed in export performance is also observed in the data from the household surveys.[8] Table 1 reports some key characteristics of the labor force employed in the textile and apparel industry in Madagascar at three points in time.

Table 1 – Characteristics of textile and apparel industry in Madagascar
1997-1999-2001

	1997	1999	2001
Number of Employees	46,000	136,000	191,000
Skilled workers (%)	51%	54%	46%
Unskilled workers (%)	49%	46%	56%
Average years of education	8.5	9	7.9
Temporary employment (%)	34%	39%	20%
Workers below the povery line (%)	50%	39%	42%
Average earnings	$37	$39	$50
of skilled workers	$41	$52	$76
of unskilled workers	$32	$29	$33
Average age	36	34	32
Female laborforce (%)	76%	75%	80%
Workers' Localization by Region (%)			
Urban Antananarivo	49%	58%	44%
Rural Antananarivo	9%	32%	41%
Other	42%	10%	25%

During the late 1990s employment in the industry, as observed from the analysis of household surveys, grew at a very fast pace. In 1997, about 46,000 individuals reported

[7] The ability to source their intermediate inputs from anywhere in the world was applicable only until 2004. Also, quota free access ceases to be an advantage after 2004 as all quotas on textiles and apparel trading between WTO members are eliminated.
[8] The analysis relies on data from the 2001 *Enquete Prioritaire Aupres des Menages* (EPM) collected by the Direction des Statistiques des Ménages (DSM) of the Institut National de la Statistique (INSTAT) in Madagascar.

employment in the textile sector.[9] Employment was reported at about 135,000 individuals in 1999, and by 2001 total employment in the textile and apparel industry had risen to almost 200,000 individuals (or about 2 percent of the active workforce). The textile industry was in 2001 already the fourth most important sector of employment after agriculture (74%), commerce (6%) and public administration (2.5%).

About three-quarters of the labor force is women, and about half of it is skilled. The labor force is fairly young (average age is in the early 30s) and fairly educated, as the average worker reported about 8 years of formal education. The industry is localized predominantly in the capital, with about 90% of its employees residing in the urban and rural areas in the province of Antananarivo. The industry relies on temporary workers for about 20 percent of its labor force and pays average wages of about the equivalent of 50 USD per month. Skilled workers earn substantially more, about 76 USD per month compared to about 33 USD per month for unskilled employees. About 42 percent of the employees in the industry report expenditures below the poverty line.

During the period from 1997 to 2001, the characteristics of textile and apparel workers did not change substantially. The fact that the percentage of skilled workers has been declining (especially between 1999 and 2001) together with a reduction in the average age of employees, suggests a possible shortage in the supply of skilled labor, or an increase of reliance upon "in firm" training which is not observed in the data. The percentage of temporary workers has been declining as well, which could suggest a more mature industry no longer subjected to a high oscillation in orders. With the increase in employment, the average wages paid to employees also rose substantially in the late 1990s. Average wages rose from about 37 USD per month in 1997 to about 50 USD in 2001. However, real wages have increased at a very different pace between skilled and unskilled workers. While the real wage of skilled workers almost doubled between 1997 and 2001, the wage of unskilled workers rose only minimally in real terms.

[9] This number may be underestimated as the Industriel Census 1995 (RI95) and Annual Inquiry in Industry 1996 (EAI96) report similar numbers for 1995 with an expected growth rate in employment of 28.6% per

3. Identifying Beneficiaries and Benefits: a Household-based Approach

In an exercise seeking to identify the beneficiaries of a development strategy, the standard neoclassical approach used by CGE models in which market wages adjust to clear labor markets for a few broad categories of workers ignores much useful information on the characteristics of individuals. Besides using information available in household surveys, an alternative approach whereby firms choose individuals with characteristics that closest match those of incumbents, assumed to be initially optimal, presents a more accurate view of firm behavior.[10] Furthermore, the neoclassical approach does not easily allow one to assign benefits to individuals, thereby missing aspects critical to quantifying the effects on a micro economic phenomenon such as poverty.

To spell out a full model of firm behavior with multiple types of labor is beyond the purpose of this paper, however the approach used here is fully compatible with the profit maximizing behavior of firms in a competitive setting, as well as within a setting of monopsonystic labor demand. In this regard, wages paid by firms in each sector can be assumed to represent the value of marginal product of labor embedded in individual characteristics after controlling for exogenous factors (so that wages can increase with the price of output). Alternatively, firms can also be assumed to pay wages below the marginal product of labor (so that wages can increase with the decreasing of monopsony power as in the case when new firms enter the market).

To estimate the impact on household welfare resulting from growth in employment and an increase in wages, this paper combines the matching methodology literature (Heckman, Ichimura and Todd, 1997) with the industry wage premium literature (Krueger and Summers 1988, Helwege 1992, Haisken DeNew and Schmidt 1997).[11]

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year.

[10] The underlining assumption is that the characteristics of the workers already employed in the textile and apparel industry match the skills required by the industry. This assumption avoids the need of firm level data to observe the optimal labor force demand by the industry.

[11] The model builds on Nicita and Razzaz (2003).

In summary, this methodology identifies those individuals that best match the characteristics sought by the expanding sector, and estimates individuals' wage premium that the expanding sector offers relative to the former sector of employment, as well as the expected increase in the earnings of workers in the expanding sector. As a last step, the predicted increase in income is distributed across household members to obtain estimates of poverty levels and social indicators. This methodological approach is applied to study the welfare effects of export led growth in one sector (textile and apparel), but can be easily extended to a setting with multiple sectors.[12]

Because of data constraints the labor force is assumed to be divided into four broad sectors of employment: informal, services, textiles (the expanding industry), and other industries. The informal sector can be thought of as a reserve labor sector and is composed of agriculture, small commerce and other marginal sectors identified as informal in the data. The selection process is achieved by estimating propensity scores, that is the predicted probability that each individual has of being selected based on his observed characteristics.[13] The propensity scores are obtained from the estimation of a logit model.

$$L_i = \beta_0 + \beta_1 X_i + \beta_2 H_i + \varepsilon_i \qquad (1)$$

Where L_i is the logit of a dichotomous variable that takes the value 1 if the *i* th individual is employed in the textile sector and 0 otherwise, X_i is a vector of individual characteristics, and H_i is a vector of household characteristics. Expansion in the textile sector will then imply drawing resources, including labor, to this sector.

The core of the analysis is the impact on the labor market resulting from expansion in the textile sector. Each person has a probability of becoming employed in the textile sector to

[12] In particular, the propensity score would need to be estimated via a multinomial logit, and propensity scores would be assigned to take into account individuals' best matches across sectors.
[13] The estimation ranks the individuals according to their propensity to be employed in the textile and apparel sector based on the characteristics of the individuals already employed in the same sector.

seek higher pay. The probability of moving into the textile sector is a function of a series of demographic characteristics. These include gender, age, level of education, head of household status, marital status, urban or rural location, regional location, number of members in the household, and a dummy for the presence of other family members working in the textile sector. The individuals are then ranked according to the estimated probabilities and, for those with the highest rank, the sector of employment is changed to textiles.[14]

The second step involves the measurement of the wage premium enjoyed by textile and apparel workers relative to other sectors of the economy. As seen in section 2, wages in the textile sector are observed to be significantly higher than in the informal sectors, however this difference could be driven by workers' characteristics and local cost of living.[15] To better estimate the wage premiums across the various sectors of the economy, the wage differential of every individual is estimated as the difference between the observed wages of similar individuals across the four economic sectors. The estimation regresses the log of worker *i*'s wages ($\ln W_{ij}$) on a vector of worker *i*'s characteristics (X_{ij}) and a set of industry indicators (I_{ij}) and takes the Mincerian form:

$$\ln W_{ij} = \beta_0 + \beta_1 X_{ij} + \beta_2 I_{ij} + \varepsilon_{ij} \qquad (2)$$

The underlying assumption of this model is that workers' characteristics proxy for their skills and that skill levels closely reflect productivity and wages. The specification follows Krueger and Lindahl (2001).

Workers' characteristics include gender, age, education, head of household status, number of household members, marital status, and formality of employment. A

[14] The plausibility of those estimates can be checked analyzing the composition of the employees in the industry across time. Table 1 reports little change of workers characteristics between 1997 and 2001, therefore it is plausible that the industry draws new employment with characteristics and skills similar to existing employees.

[15] The informal sector is defined to include non-commercial agriculture, small commerce and other sectors categorized as informal or marginal in the household survey.

dichotomous variable for the gender of the household's head controls for women headed households. Urban/rural and regional indicators control for wage differentials across space. The coefficient on the industry variable captures the wage premium paid by each industry in comparison to the textile and apparel industry (which is omitted).[16] Moreover, because not all individuals report wages, to calculate wage premiums one must first impute a predicted wage for all the individuals for which the actual wage is not observed.[17]

The next step is to estimate to what extent wages have grown for the various typologies of workers.[18] In predicting wage growth for textile workers, the assumption is that future wage growth will be identical to the wage growth observed between 1999 and 2001 which can be assumed to be "typical". To see whether real wages have increased for some categories of workers more than for others, the estimates are obtained by pooling together the cross sectional data from the 1999 and 2001 household surveys. The estimation is constrained by the scarcity of a wider time series and by the differences between the two surveys in the construction of some of the variables. The estimation takes the simple form:

$$\ln W_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 T_{it} + \beta_3 X_{it} T_{it} + \varepsilon_{it} \qquad (3)$$

Where $\ln W_{it}$ is the log of the wage of the individual *i* in time *t*, X_{it} is a vector of individual characteristics which include gender, skilled/unskilled[19] and age. T_i is a time dummy that takes value 1 for 2001. Therefore, the coefficient on the time dummy

[16] In other words the coefficient of the industry dummy represents the part of the variation in wages that cannot be explained by worker characteristics, but can be explained by the workers' industry affiliation.
[17] This is done by estimating the wage equation (2) for each of the four sectors of the economy. To impute reservation wages for workers whose earnings are not observed (such as intra-household workers and formally unemployed) their wages are assumed equated to the wages with workers of similar characteristics employed in the informal sector.
[18] The implicit assumption is that workers' earnings grow at different paces as a function of labor demand and supply for particular skills.
[19] An individual is considered skilled if he or she has completed more than 9 years of education, or has completed 6 years of education and is older than 35, or has completed 6 years of education and has had technical education in the textile sector.

captures the wage differential between 1999 and 2001 while the interaction terms, $X_{it}T_{it}$, capture the time differential effects for gender, skilled/unskilled, and age.

The results from the econometric estimates are then used in a simulation exercise. Having identified the individuals that are more likely to move into the textile industry and having estimated their specific wage differential, it is now possible to calculate the impact on household income and social welfare.[20]

In the simplest model, the indirect utility function of the households can be written as:

$$u_h = V_h[y_h, P] \qquad \text{where:} \qquad y_h = w\ell_h \qquad (4)$$

Household utility u_h is expressed as a function of a vector of prices *P* faced by the household and the household's income y_h, which in turn is a function of the amount of labor the household sells on the market ℓ_h at the prevailing wage *w*. Prices *P* are assumed to be fixed, while income varies with the change in sector of employment and the increase in real wages.

Further, assuming that households choose optimally the amount of labor to sell in the labor market, the effect of prices and wages on profits can be obtained by differentiating (4) and dividing by income of household *h* to obtain the percentage change in welfare:

$$\frac{du_h}{y_h} = \theta_h^{\ell} dw_h \qquad (5)$$

where $\theta_h^{\ell} = w\ell_h / y_h$ is the share of income obtained in the labor market by household *h*.

For the sake of simplicity, the social welfare function is assumed Paretian, so that the increase in anybody's income in the society is welfare augmenting. In this setup, the

[20] Household income is simply the sum of the income of each of its members.

change in social welfare *W* can be written as the sum of the change in the welfare of each individual household:[21]

$$dW = \sum_h du_h = \sum_h \theta_h^{\ell} dw_h y_h \qquad (6)$$

where the change in wage income dw_h of the household is calculated as follows:

$$dw_h = \sum_i dw_i = \left[(1 + zw_i)(1 + kw_i)^t - 1 \right] R_i \qquad (7)$$

where zw_i is the wage differential for individual *i* estimated by equation (2), kw_i is the increase in the wage for the individual *i* in household *h* between 1999 and 2001 estimated by equation (3). Finally, R_i is a dichotomous variable taking the value one for the individuals employed in the textile sector or for the individuals with the best matching characteristics estimated according to equation (1), and zero otherwise.

4. Estimation results: Propensity Scores and Wages

To identify the determinants that make individuals more likely to find new employment in the expanding sector, table 2 reports the result of the estimation of the propensity scores as in equation (1)[22]. The columns show the estimated coefficients with the corresponding robust standard errors corrected for survey design.

The coefficients measure the change in the log odds in favor of being selected to fill the job in the textile industry as the dependent variable changes by a unit. For example, residing in urban areas increases the log odd by 0.62 (taking the antilog will result in

[21] For the purpose of this paper, a different welfare function such as the one proposed by Atkinson, where social marginal utility is assumed to be inversely related to income rank, would complicate the computation without adding much to the methodology or the results.

[22] The estimation is restricted to individuals not employed in the formal sector. This corrects for the fact that formally employed individuals are not likely to switch sector of employment due to sector-specific unobserved skills.

approximately an 86 percent increase in the odds of being selected). Similarly, it is possible to see that the odds of being selected peak for individuals with about 11 years of education, and at the age of 30. The most important determinant of being selected is the presence of another family member employed in the textile industry. Important determinants are also gender (women are overwhelmingly favored) and household size (individuals in larger households have lower log odds). The significance of the coefficient on the interaction term gender*education suggests that education is more important for men as a determinant of being selected. Regional dummies are also significant, with the Antananarivo region having the highest log odds.

Table 2 – Propensity scores estimation

(dependent variable – dummy textile employment = 1)

Variable	Coefficient	S.E
Age	0.287***	(0.082)
Age squared	-0.005***	(0.001)
Education	1.180***	(0.169)
Education squared	-0.056***	(0.008)
Gender	-2.360*	(1.118)
Gender*Age	-0.017	(0.022)
Gender*Educ	0.169**	(0.080)
Marital Status	-0.339	(0.271)
Region1 dummy	-12.220***	(1.333)
Region2 dummy	-14.240***	(1.481)
Region3 dummy	-15.110***	(1.436)
Region4 dummy	-14.300***	(1.396)
Region5 dummy	-15.400***	(1.572)
Region6 dummy	-14.180***	(1.390)
Urban/Rural	0.620***	(0.203)
HH size	-0.119**	(0.053)
Textile work hh member	3.843***	(0.546)

Observations	4396
Pop. Size	5289293
Adj R squared	0.544

Note: Robust standard errors are shown in brackets. Significance level of 1%, 5% and 10% are indicated by ***, ** and * respectively.

The results on the propensity scores make it possible to compare the characteristics of the individuals selected with the ones already in the industry. Table 3 reports some of the characteristics of the 100,000 individuals with the estimated highest propensity score along with the characteristics of the employees in the textile and apparel industry in 2001.

Table 3 – Characteristics of the 100,000 best matching individuals to fit jobs in the textile and apparel industry.

	Employees	Best Matching	95% c.i.	
Number of Employees	191,000	100,000	lower	upper
Skilled workers (%)	46.3%	42.1%	41.0%	43.2%
Average years of education	7.9	10.0	9.8	10.1
Temporary employment (%)	20.0%	34.2%	33.1%	35.2%
Workers below the povery line (%)	42.1%	78.7%	78.0%	79.5%
Average earnings	$50	28.6	27.2	30.0
of skilled workers	$76	47.1	43.9	50.3
of unskilled workers	$33	19.5	17.7	21.3
Average age	32	31.9	31.7	32.1
Female laborforce (%)	79.6%	76.2%	75.0%	77.4%
Workers' Localization by Region (%)				
Urban Antananarivo	43.6%	39.8%	38.8%	40.9%
Rural Antananarivo	40.0%	47.4%	46.0%	48.8%
Other	16.4%	12.8%	11.9%	13.6%

The best matching individuals appear to be generally similar to the employees in the textile and apparel sector. The only evident difference is that the latter seem to have slightly lower formal education. More importantly, the earnings of the textile workers are substantially higher than those of the best matching individuals suggesting that employment in the textile and apparel sector would result in substantial welfare impact for the new entrants.

To analyze the extent to which earnings are different across economic sectors, table 4 reports the coefficients from the estimation of the earning equation (2) along with their robust standard errors. Equation (2) is estimated in two ways, first with the entire sample, and then separately for unskilled and skilled workers so as to better capture eventual differences across skills (assuming segmented labor markets across broad skills).

Table 4 – Wage regression estimation

(dependent variable: log earnings)

	All		Unskilled		Skilled	
Variable	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Age	0.014***	(0.002)	0.011***	(0.003)	0.017***	(0.002)
Urban/Rural	0.039	(0.039)	0.026	(0.055)	0.065	(0.041)
Marital Status dummy	0.06	(0.045)	0.098	(0.064)	0.071	(0.047)
Education	0.087***	(0.006)	0.098***	(0.017)	0.104***	(0.010)
Manufacturing dummy	0.069	(0.076)	-0.073	(0.100)	0.193*	(0.101)
Service dummy	0.061	(0.076)	-0.073	(0.110)	0.177**	(0.081)
Informal dummy	-0.343***	(0.086)	-0.531***	(0.110)	-0.377**	(0.149)
HH head dummy	0.035	(0.058)	0.065	(0.072)	0.151***	(0.058)
Temporary employment	-0.105**	(0.041)	-0.03	(0.073)	-0.173***	(0.040)
HH size	-0.023	(0.014)	-0.025	(0.019)	-0.008	(0.010)
Gender	0.250***	(0.060)	0.258***	(0.071)	0.083	(0.053)
Region1 dummy	11.073***	(0.115)	11.142***	(0.181)	10.607***	(0.169)
Region2 dummy	10.938***	(0.142)	10.958***	(0.218)	10.378***	(0.172)
Region3 dummy	11.018***	(0.140)	11.134***	(0.225)	10.583***	(0.175)
Region4 dummy	11.131***	(0.133)	11.347***	(0.230)	10.515***	(0.172)
Region5 dummy	11.105***	(0.127)	11.191***	(0.211)	10.547***	(0.172)
Region6 dummy	11.279***	(0.127)	11.573***	(0.200)	10.577***	(0.176)
Observations	2760		1518		1242	
Pop Size	1251581		767526		484055	
Adj R squared	0.508		0.344		0.417	

Note: Robust standard errors are shown in brackets. Significance level of 1%, 5% and 10% are indicated by ***, ** and * respectively.

All the variables of interest are significant and have the expected sign. In particular, age, education, and gender have all positive signs and are significant at the 5 percent level or better. The coefficient on the education variable shows that each year of education is reflected in an increase of about 9 percent in earnings across all workers, while the coefficient on the gender dummy indicates that, ceteris paribus, men have a wage 28 percent higher than women. The coefficient on the industry dummies reports the wage differential with respect to the textile industry. On average, employment in the textile industry has a premium of about 40 percent with respect to the informal sector. When the equation is estimated for skilled and unskilled workers, the premium resulted higher for

unskilled workers (69 percent) than for skilled workers (44 percent).[23] No significant differences are present between the wages of textile workers and workers in the manufacturing and services sector, with the exception of skilled workers in the service sector whose earnings were estimated to be about 19 percent higher relative to similar individuals in the textile and apparel industry.

Finally, to analyze the changes in wages occurring between 1999 and 2001 in the textile and apparel sector, table 5 presents the coefficient from the estimation of the pooled regression (equation 3) along with the robust standard errors. The estimation is performed with three different specifications to take into account different effects.

Table 5 – Pooled regression estimation

(dependent variable: log earnings)

	Specification 1		*Specification 2*		*Specification 3*	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
constant	11.214***	(0.136)	10.646***	(0.259)	11.304***	(0.209)
Age	0.010***	(0.004)	0.008*	(0.005)	0.010*	(0.005)
Gender	0.390***	(0.081)	0.275**	(0.108)	0.356***	(0.110)
Year dummy	0.261***	(0.073)	0.259**	(0.116)	0.081	(0.138)
Skill Dummy	0.408***	(0.078)			0.306***	(0.113)
Years of Education			0.102***	(0.022)		
Skill*Year					0.268*	(0.148)
Observations	464		464		464	
Pop. Size	196649		196649		196649	
Adj R squared	0.133		0.204		0.151	

Note: Robust standard errors are shown in brackets. Significance level of 1%, 5% and 10% are indicated by ***, ** and * respectively.

Considering only the simple specification without the interaction terms, and correcting for differences in skills, age and gender, the coefficient on the year dummy indicates an increase in the average wage of about 30 percent in two years. The second specification utilizes a categorical variable (years of education), instead of a dummy, to correct for

[23] In the computation of welfare indicators, the results used are those from the skilled and unskilled

worker skills, but without a significant change in the results. Finally, the third specification is similar to the first, but adds an interaction term (year*skill). The result suggests that while skilled wages have increased by approximately 31 percent, unskilled wages did not report any significant increase in real terms.[24]

5. The Effects of Export Led Growth on the Poor

Having identified the individuals that best match the skills sought by the expanding industry, the wage differentials between economic sectors, and the trend in the wages in the textile and apparel sector, it is now possible to measure the effect that the growth of the textile and apparel industry has on its workers and on social welfare in general. The micro simulation results reported here are for two five year scenarios. The first scenario (low growth) assumes a rate of growth in employment of 10 percent per year while the second scenario (high growth) assumes a rate of growth of 20 percent per year. Table 6 presents the average gains for several typologies of worker in the textile and apparel sector in five year scenarios of low and high economic growth.

Table 6 – Average monetary gains per worker

	Low-Growth Scenario		High-Growth Scenario	
	Average Gains per Worker (USD)	# workers (thousand)	Average Gains per Worker (USD)	# workers (thousand)
Total	**112**	**310**	**104**	**430**
Skilled	*165*	*196*	*160*	*255*
Unskilled	*47*	*114*	*48*	*175*
Men	*143*	*72*	*144*	*98*
Women	*102*	*238*	*92*	*332*

In the low growth case, the average gains per worker correspond to an increase in real wages of about 112 dollars per month. Skilled workers gain more than three times relative to unskilled workers (165 USD per month vs. 47 USD per month). Moreover,

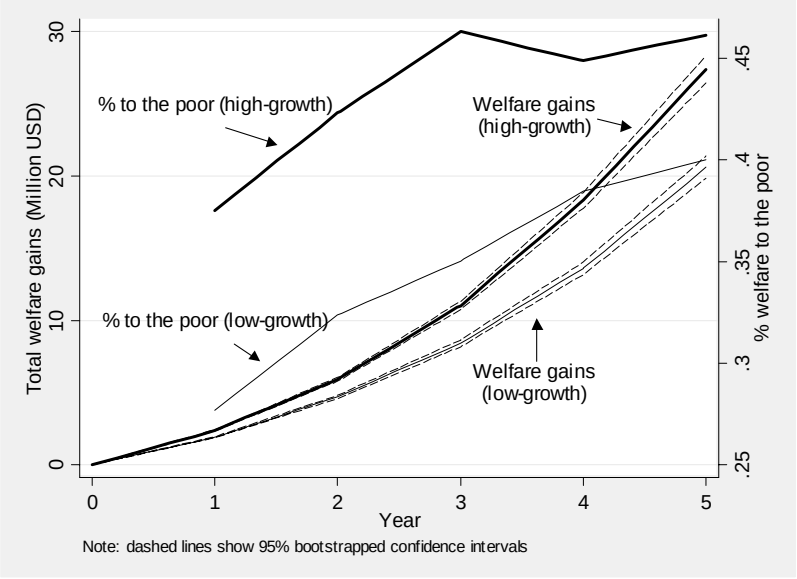
regressions.

[24] Specification three is used in the computation of welfare indicators.

women gain substantially less than men (102 USD per month vs. 143 USD per month). Gains per worker are similarly distributed in the case of the high growth scenario. However, average gains per worker are lower in the high growth scenario relative to the low growth scenario. The reason for this is that a high rate of growth will likely hit a shortage in the supply of skilled labor and therefore draw a higher percentage of less skilled workers for which, on average, gains are lower.

The change in social welfare is approximated by the sum of the changes in the monetary income of each household (as in equation 7). Figure 2 illustrates the change in social welfare (in real dollars per month) for the two scenarios. To better illustrate how much welfare is actually to the benefit of poor households, figure 2 also reports lines to indicate the percentage of social welfare that is to the direct benefit of the poor. In other words, the lines in figure 2 illustrate of the extent to which economic growth is pro poor or marginalizes the poor in the two growth scenarios. For example, very low percentages would imply that non poor households reap most of the benefits, so that growth will do little to affect poverty levels. On the contrary, high percentage values imply that the poor as a whole are very participant of the benefits.

Figure 2 – Change in social welfare



In a five year scenario of high employment growth, the change in social welfare (at the fifth year) is estimated to be about 30 million USD.[25] Results are lower in the case of the low growth scenario (20 million USD). The results indicate that, in the fifth year of economic growth the poor reap about 45 percent of the change in welfare in the high growth scenario and about 39 percent in the low growth scenario. The upward slope of the lines in figure 2 shows that the poor tend to benefit much less in the short term. This result is driven by the fact that the boom of the textile industry draws employment at an increasing rate from the poorer sector of the population (that is, the new employees added to the industry in the first year are richer than the new employees added in the fifth year). In any case, given the fact that the poor as a whole represent about 70 percent of the population, but collect less than half of the benefits, a consequence of economic growth would be an increase in inequality, especially in the short term.

The gains in social welfare across the five years indicate that the percentage of gain collected by the poor increases with time: 30 percent of welfare will be to the benefit of the poor in the first year versus 45 percent in the fifth year. This is possibly driven by the fact that the textile and apparel industry draws at an increasing pace from the poor strata of the population to fuel its growth, suggesting that a short period of growth will produce less significant changes in poverty rates.

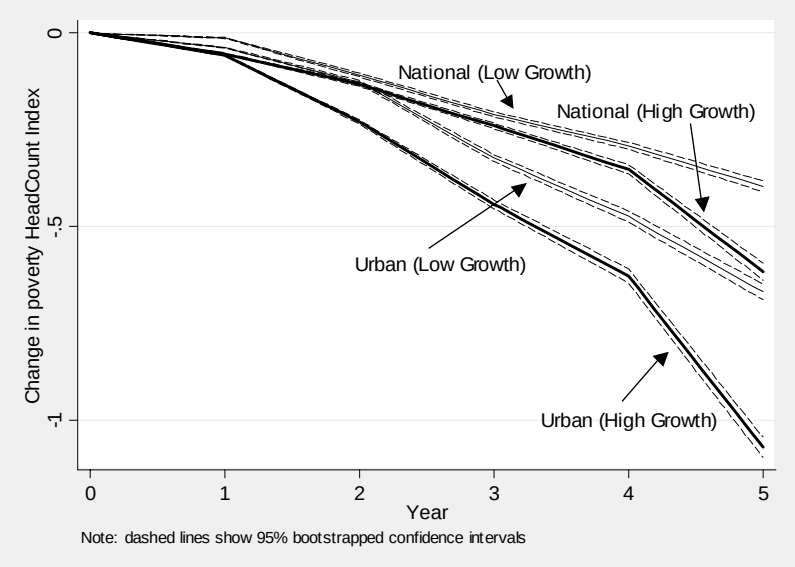
Figure 3 presents national changes in the poverty rates (solid lines) as well as changes in urban poverty (dashed lines).

As a direct effect of five years of sustained employment growth in the textile and apparel industry, overall poverty is expected to fall by about 0.7 percentage point (or about 120 thousand individuals). In the case of lower rate of growth, poverty is expected to decline approximately 0.4 percentage points. However, poverty reduction is almost exclusively confined to urban areas, where poverty is expected to decline about 1.1 percentage points in the case of high growth and of about 0.7 percentage point in the case of low rates of

[25] That is: in period five households as a whole have about 30 million USD more than in period one.

growth. In rural areas (not in figure), poverty is expected to fall only about 0.4 percentage points in the case of the high growth scenario.

Figure 3 – Change in poverty Headcount index



The magnitude of these results is not surprising considering that the textile and apparel industry is quite small compared to the overall economy and the fact that the overwhelming majority of poor lives in rural areas which are less likely to harbor employment growth.

6. Summary and Conclusions

This study proposes a methodology that assesses the gains at the household level from export led growth and quantifies the extent to which growth is pro poor. In this regard, the paper responds to the need for better informed analysis in the debate on the effects of globalization. The methodology is applied to the effects of the growth of the Malagasy textile industry, which provides a significant example of the likely effects on poverty resulting from comparative advantage based growth.

The findings suggest that the textile and apparel industry in Madagascar is able to provide the viable means for a significant number of individuals and households to increase income and ultimately escape from poverty. The textile industry's capability to improve households' living conditions is due to two main factors: the creation of employment and the increase in wages. Regarding employment, fueled by an increase in exports, employment in the textile and apparel industry grew at a rate of more than 20 percent per year in the late 1990s. Regarding wages, the textile and apparel industry has an average earning premium of about 40 percent over the average income of the workers in the informal sectors and wages have been rapidly increasing. However, even if job creation has been to the advantage of poor individuals the increase in wages has been limited to skilled workers with the consequence that poor individuals providing unskilled labor are unlikely to experience an increase in wages as long as we see a large reserve unskilled labor force and continued high turnover in unskilled textile jobs.

From a distributional perspective, the results found that non poor households collect the bulk of the gains both in absolute and relative terms. However, the poor still reap about 45 percent of the change in welfare. Given that about 70 percent of the Malagasy population is poor, an effect of the expansion of the textile and apparel sector would be an increase in inequality between poor and non poor, between urban and rural areas, and between skilled and unskilled workers.

From a poverty perspective, without taking into account inevitable positive spillovers to other sectors of the economy, the results indicate that in a five year period of sustained expansion of the textile and apparel sector, poverty is expected to fall by about 0.7 percentage points or 120,000 individuals. At the individual level, the growth in the textile sector will produce an average increase in the wages of each worker (former or new) of about 110 US dollars per month. Although for many of them the gains may not be sufficient to lift their family out of poverty, they surely represent a substantial improvement.

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Data Appendix

The analysis relies primarily on data from the 2001 *Enquete Prioritaire Aupres des Menages* (EPM).[26] The household level data used for the analysis were collected by the Direction des Statistiques des Ménages (DSM) of the Institut National de la Statistique (INSTAT) in Madagascar. The surveys are stratified, multi staged and clustered. The 2001 survey was collected from September to November 2001 and is representative of the entire population. The surveys are designed to be representative at the regional level (*faritany*) as well as the urban/rural level within each region. The surveys include income, consumption, the households' characteristics and the individuals' characteristics. Following the standard practice in the literature, the total expenditure is used as a proxy for income to calculate poverty indicators. Because the welfare measures are concerned with the well being of individuals, all expenditures were converted to a per capita basis.[27]

One problem that often arises with the use of household surveys dataset is the presence of large deviations (outliers) that can distort estimates of regression coefficients. This is caused by the vast amount of information and the great likelihood of misreporting and typos in the collection of data. In large datasets, such as household surveys, it is impossible to check the consistency of each single observation and the commonly used solution consists of taking out the most offending observations from the regression. To correct for this issue, in addition to estimate robust standard errors[28], in all regressions I exclude the 1 percent of the observations with the highest Cook's distance.[29]

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[26] The analysis also makes use of the 1999 EPM for the estimation of the increase in wage between 1999 and 2001. The construction of the 1999 survey is similar to that of 2001. Nevertheless, some comparability problems restricted the estimation to only variables that could be considered consistent between the two surveys.

[2727] To obtain per capita measures, this paper adopts the standard practice of dividing household income and expenditures by its residents, with children of age 14 or less counting as half of adults.

[28] Robust standard errors are corrected for heteroskedasticity using the Huber-White estimates.

[29] Cook's distance is given by: $D_i = \frac{\sum_i \left(\hat{Y}_j - \hat{Y}_{i(j)}\right)^2}{p \cdot MSE}$, where $\hat{Y}_i$ is the predicted value of observation j and $\hat{Y}_{j(i)}$ is the predicted value of observation j when taking observation i out of the estimation, p is the number of parameters in the model and *MSE* is the mean squared error. In words, Cook's distance is a measure of the influence of the *i-th* observation on all the other observations.